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		TOTAL PAGE : 10
		VERSION : 2
CUSTOMER	ACCEPTANCE	SPECIFICATIONS
<div>MODEL NO . : <u>32F10(CCFL TYPES)</u> FOR MESSRS : _____</div>		
CUSTOMER'S APPROVAL		
DATE : _____		
BY : _____		

EMERGING DISPLAY
TECHNOLOGIES CORPORATION

MODEL NO .
32F10(CCFL TYPES)

VERSION
2

RECORDS OF REVISION

DOC . FIRST ISSUE

FEB.17,1998

D A T E

REVISED
PAGE
NO.

S U M M A R Y

NOV.17,1999

1~3,6

THE ENTIRE PAGES REVISED

NUMBERING SYSTEM

Polarizer Mode	Backlight	Code value
Transflective	CCFL	D
Transmissive	CCFL	C

Backlight Color	Code Value
White	W

E	W	3	2	F	1	0	B	C	W	U
---	---	---	---	---	---	---	---	---	---	---

Viewing direction
NIL. : 6 o'clock
U : 12 o'clock

LCD type + color	Code Value
STN + Gray	G
STN + Blue	B
FSTN + White	F
FSTN + Black	N

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1. GENERAL SPECIFICATIONS

1.1 GENERAL SPECIFICATIONS

PLEASE REFER TO :

CUSTOMER ACCEPTANCE STANDARD SPECIFICATIONS :

E U - 0 0 2 A

1.2 THIS INDIVIDUAL SPECIFICATION IS PRIOR TO GENERAL SPECIFICATIONS .

2. MECHANICAL SPECIFICATIONS

- | | | | |
|--------|---------------------|-------|----------------------------------|
| (1) | NUMBER OF DOTS | ----- | 320W * 240H DOTS |
| (2) | MODULE SIZE | ----- | 167.1W * 109.0H * 11.0D(max.) mm |
| (3) | EFFECTIVE AREA | ----- | 120.0W * 90.0H mm |
| (4) | ACTIVE AREA | ----- | 115.17W * 86.37H mm |
| (5) | DOT SIZE | ----- | 0.33W * 0.33H mm |
| (6) | DOT PITCH | ----- | 0.36W * 0.36H mm |
| (7) | LCD TYPE * | | |
| (8) | DRIVING METHOD | ----- | 1 / 240 DUTY MULTIPLEX DRIVE |
| (9) | VIEWING DIRECTION * | | |
| (10) | BACKLIGHT | ----- | CCFL |

* PLEASE REFER TO NUMBERING SYSTEM .

3. ABSOLUTE MAXIMUM RATINGS

3.1 ELECTRICAL ABSOLUTE MAXIMUM RATINGS .

PARAMETER	SYMBOL	MIN .	MAX .	UNIT	REMARK
POWER SUPPLY FOR LOGIC	VDD — VSS	0	6 . 0	V	
POWER SUPPLY FOR LCD DRIVING	VDD — VEE	0	27 . 0	V	
INPUT VOLTAGE	VI	VSS	VDD	V	
STATIC ELECTRICITY	—	—	100	V	NOTE (1)

NOTE (1) : TEST METHOD AND CONDITIONS :
AFTER CHARGING UP 200 PF CAPACITOR BY STATED VOLTAGE ,
THE CAPACITOR IS CONNECTED WITH INTERFACE PINS OF THE
MODULE .

3.2 ENVIRONMENTAL ABSOLUTE MAXIMUM RATINGS .

I T E M	OPERATING		STORAGE		REMARK
	MIN .	MAX .	MIN .	MAX .	
AMBIENT TEMPERATURE	- 10 °C	60 °C	- 20 °C	70 °C	NOTE (2),(3),(4)
HUMIDITY	—	85 % RH	—	85 % RH	WITHOUT CONDENSATION
VIBRATION	—	2 . 45 m/s ² (0 . 25 G)	—	11 . 76 m/s ² (1 . 2 G)	10~100 HZ XYZ DIRECTIONS 1 Hr . EACH
SHOCK	—	29 . 4 m/s ² (3 G)	—	490 . 0 m/s ² (50 G)	10 mSECONDS XYZ DIRECTIONS 1 TIME EACH
CORROSIVE GAS	NOT ACCEPTABLE		NOT ACCEPTABLE		

NOTE (2) : Ta AT -20°C : 48HR MAX .
70°C : 168HR MAX .

NOTE (3) : BACKGROUND COLOR CHANGES SLIGHTLY DEPENDING ON AMBIENT
TEMPERATURE THIS PHENOMENON IS REVERSIBLE .

NOTE (4) : CCFL BACKLIGHT IS NOT AVAILABLE TO FUNCTION BELOW 0°C

4 . ELECTRICAL CHARACTERISTICS

Ta = 25 °C

VDD = 5.0 V

PARAMETER	SYMBOL	CONDITION	MIN .	TYP.	MAX .	UNIT
POWER SUPPLY VOLTAGE FOR LOGIC	VDD — VSS	—	4.75	5.0	5.25	V
POWER SUPPLY VOLTAGE FOR LCD DRIVE	VEE — VSS	—	-21.5	-22.0	-22.5	V
INPUT VOLTAGE NOTE (1)	VIH	H LEVEL	0.8*VDD	—	—	V
	VIL	L LEVEL	—	—	0.2*VDD	V
OUTPUT VOLTAGE NOTE (1)	VOH	H LEVEL	2.4	—	—	V
	VOL	L LEVEL	—	—	VSS+0.4	V
POWER SUPPLY CURRENT FOR LOGIC NOTE (2)	IDD	VDD-VSS = 5.0 V VDD-VEE = 2.0 V	—	3.0	—	mA
POWER SUPPLY CURRENT FOR LCD DRIVE NOTE (2)	IEE	VDD-VSS = 5.0 V VDD-VEE = 2.0 V	—	2.8	—	mA
RECOMMENDED LCD DRIVING VOLTAGE NOTE (3)	VDD-V0 Ø = 10° , θ = ** DUTY = 1/240	Ta = -10 °C	—	25.1	—	V
		Ta = 25 °C	—	23	—	V
		Ta = 60 °C	—	21.3	—	V
CLOCK OSCILLATION FREQUENCY	f FLM	—	70	75	80	HZ
POWER SUPPLY FOR CCFL	VOLTAGE	VCCFL	—	300	—	Vrms
	FREQUENCY	f CCFL	—	30K	—	HZ
	CURRENT	IL	—	5	—	mA
	LIFE TIME	L	IL = 5.0mA	15000	20000	Hrs

** θ = 0° WHEN VIEWING DIRECTION IS 6 O'CLOCK .

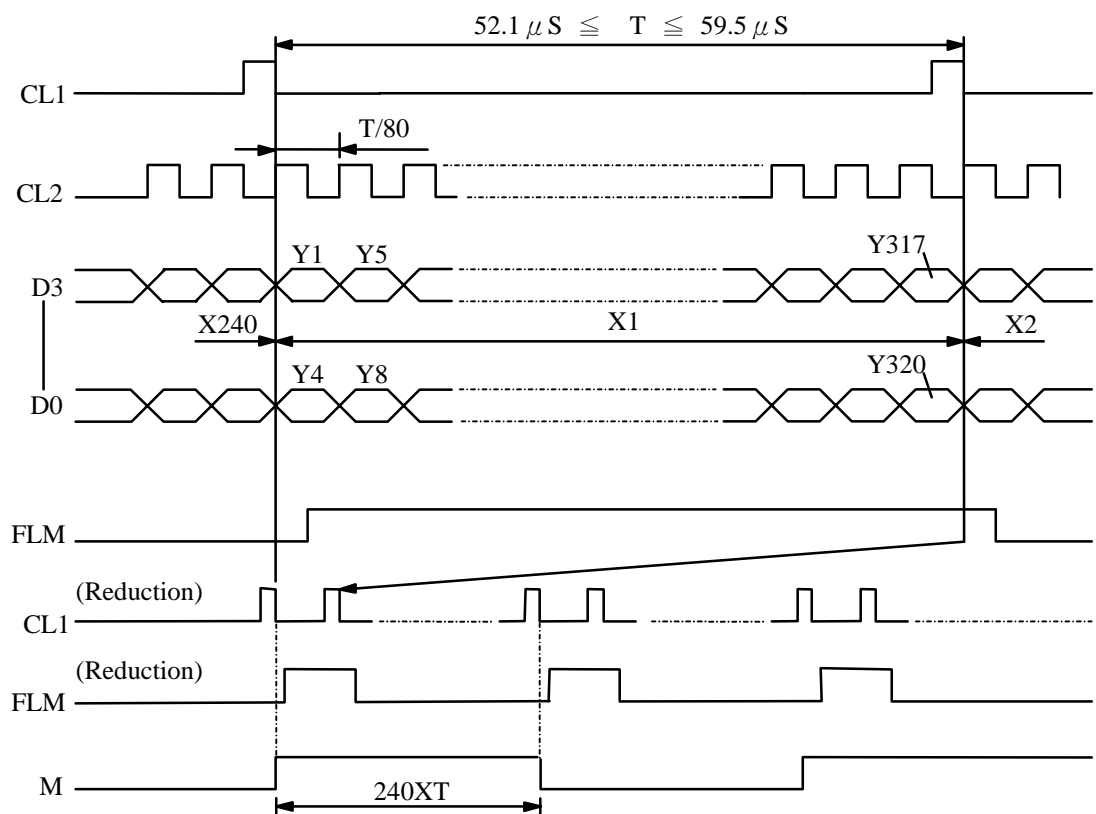
θ = 180° WHEN VIEWING DIRECTION IS 12 O'CLOCK .

NOTE (1) : APPLIED TO TERMINALS M , FLM , CL1 , CL2 , D0~D3 , DISPOFF .

NOTE (2) : THE DISPLAY PATTERN IS ALL "OFF"/ "ON" .

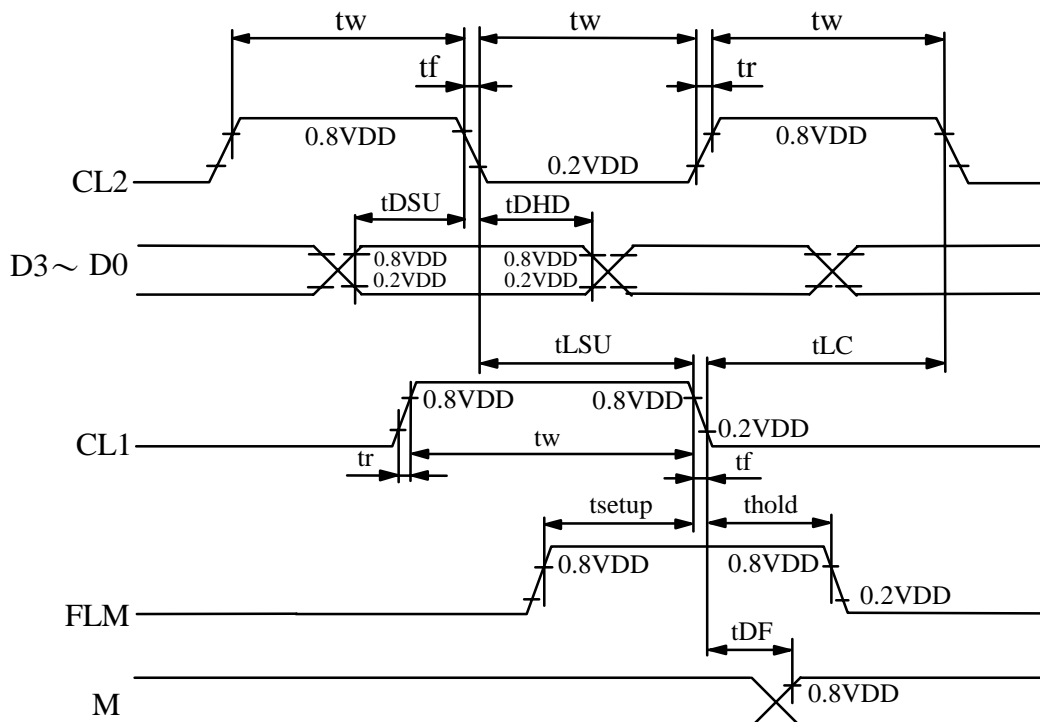
NOTE (3) : RECOMMENDED LCD DRIVING VOLTAGE MAY FLUCTUATE ABOUT
± 1.0V BY EACH MODULE .

5. TIMING CHARACTERISTICS
5.1 INTERFACE TIMING



5.2 SWITCHING CHARACTERISTICS

PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNIT
Frequency of maximum clock	fcp	—	—	8	MHZ
CL1 , CL2 , pulse width	tw	45	—	—	ns
Rise , fall time	tr,tf	—	—	15	ns
Data setup time	tDSU	20	—	—	ns
Data hold time	tDHD	20	—	—	ns
CL1 setup time	tLSU	80	—	—	ns
CL1 → CL2 time	tLC	80	—	—	ns
FLM setup time	tsetup	100	—	—	ns
FLM hold time	thold	100	—	—	ns
M delay time	tDF	—	—	300	ns



6. OPTICAL CHARACTERISTICS

Ta = 25 °C

VDD = 5.0 V

I T E M		SYMBOL	CONDITION		MIN .	TYP .	MAX.	UNIT	NOTE
VIEWING AREA	STN	Ø2 - Ø1	K ≥ 2.0		—	40	—	d e g .	1
	FSTN				—	50	—	d e g .	1
CONTRAST RATIO	STN	K	Ø = 10 ° θ = * *		—	10	—	—	1
	FSTN				—	20	—	—	1
RESPONSE TIME		tr (rise)	Ø=10° θ = * *	Ta = -10 °C	—	2149	—	ms	1
				Ta = 25 °C	—	228	—		
				Ta = 60 °C	—	124	—		
		tf (fall)		Ta = -10 °C	—	1709	—		
				Ta = 25 °C	—	191	—		
				Ta = 60 °C	—	96	—		
BRIGHTNESS OF BACKLIGHT		B	—		300	—	—	cd / m²	2
RISE TIME OF BACKLIGHT		TC	—		—	5	—	MINUTE	
BRIGHTNESS UNIFORMITY		—	—		—	—	20	%	3 , 4

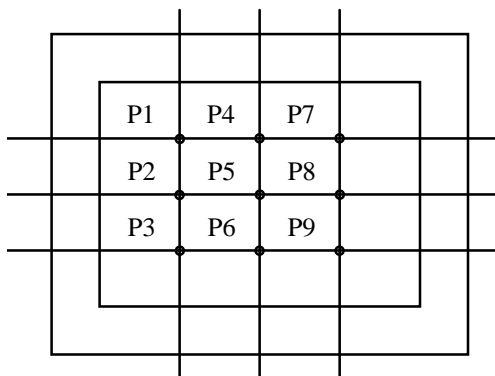
** $\theta = 0^\circ$ WHEN VIEWING DIRECTION IS 6 O'CLOCK .

$\theta = 180^\circ$ WHEN VIEWING DIRECTION IS 12 O'CLOCK .

NOTE (1) : PLEASE REFER TO :
CUSTOMER ACCEPTANCE STANDARD SPECIFICATIONS. (EU - 001A)

NOTE (2) : POLARIZER MODE : TRANSMISSIVE

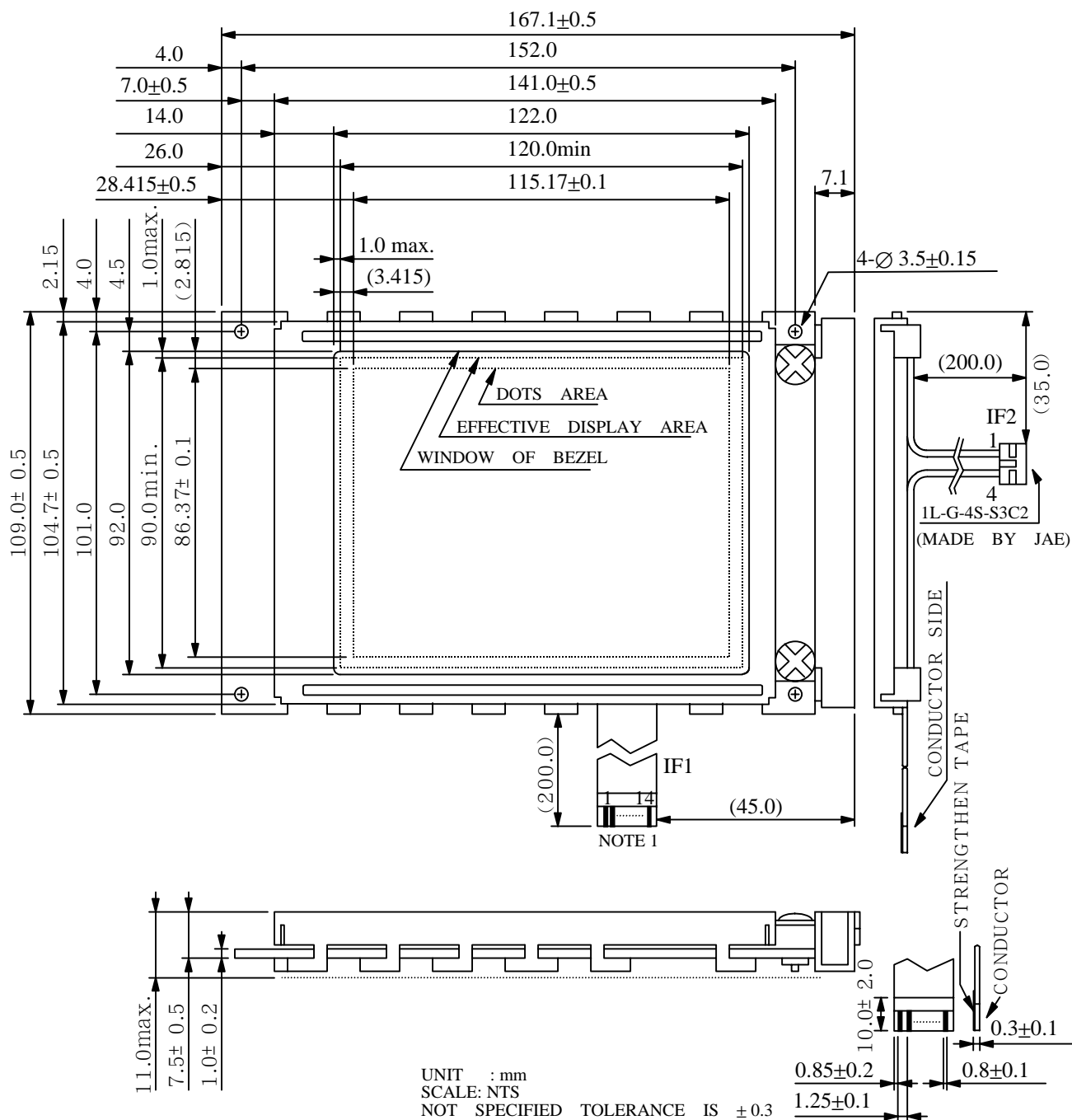
NOTE (3) : MEASUREMENT OF THE FOLLOWING 9 PLACES ON THE DISPLAY.
DEFINITION OF THE BRIGHTNESS TOLERANCE .



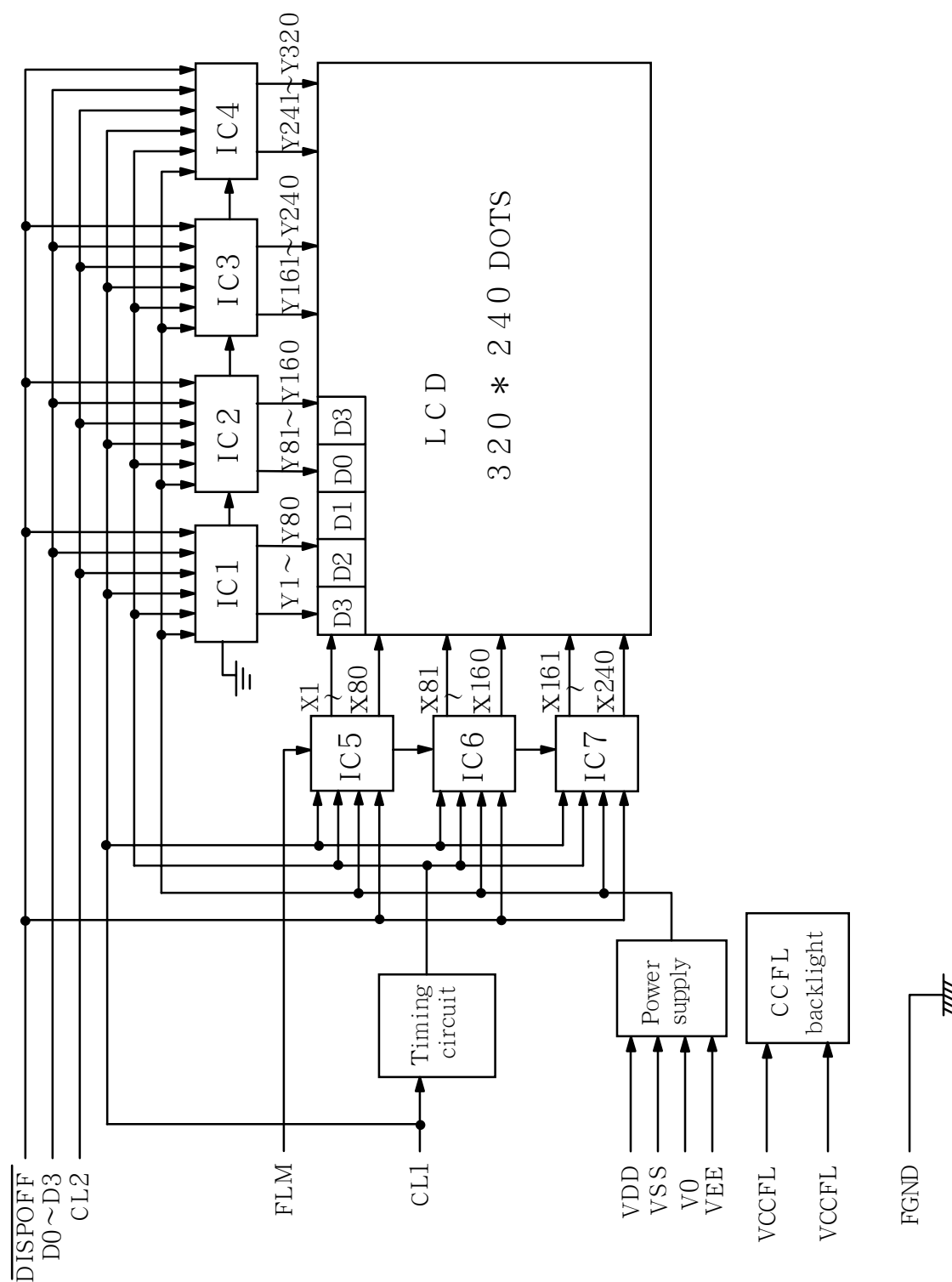
NOTE (4) : BRIGHTNESS UNIFORMITY IS DEFINED AS FOLLOWING

$$\sum_X = \left[\frac{(\text{MAXIMUN BRIGHTNESS OR MINIMUN BRIGHTESS}) - \text{AVERAGE BRIGHTNESS}}{\text{AVERAGE BRIGHTNESS}} \right] \times 100\%$$

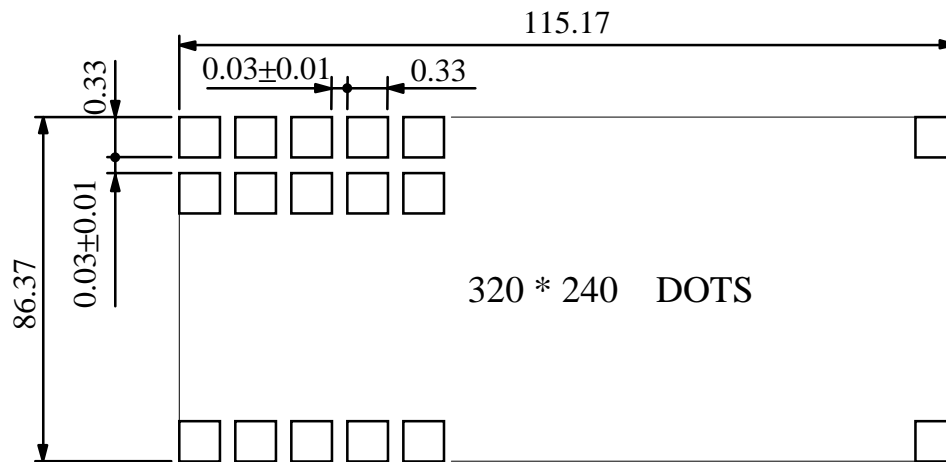
7. OUTLINE DIMENSION



NOTE 1 : MAKER : SUMITOMO (JAPAN)



9. DETAIL DRAWING OF DOT MATRIX



UNIT : mm
SCALE : NTS
NOT SPECIFIED TOLERANCE IS ± 0.1

10. INTERFACE SIGNALS

IF1 :

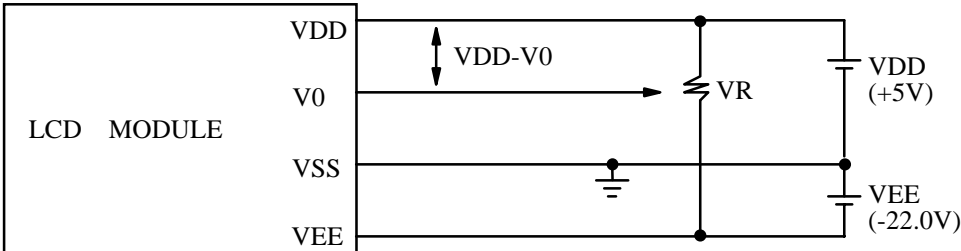
PIN NO	SYMBOL	LEVEL	FUNCTION
1	D0	H / L	DISPLAY DATA
2	D1	H / L	
3	D2	H / L	
4	D3	H / L	
5	$\overline{\text{DISPOFF}}$	H / L	H : DISPLAY ON , L : DISPLAY OFF
6	FLM	H	THE FLM SIGNAL INDICATING THE BEGINNING OF EACH DISPLAY CYCLE
7	NC	—	NO CONNECTION
8	CL1	H \rightarrow L	DISPLAY DATA LATCH
9	CL2	H \rightarrow L	DISPLAY DATA SHIFT
10	VDD	—	POWER SUPPLY FOR LOGIC CIRCUIT
11	VSS	—	GROUND
12	VEE	—	POWER SUPPLY FOR LCD DRIVING
13	VO	—	OPERATING VOLTAGE FOR LCD DRIVING
14	FGND	—	FRONT PANEL GROUND

IF2 :

INTERFACE	PIN	SINGAL	VEVEL	FUNCTION
CCFL	1	VCCFL	—	POWER SUPPLY FOR CCFL DRIVING
	2~3	NC	—	NO CONNECTION
	4	VCCFL	—	POWER SUPPLY FOR CCFL DRIVING

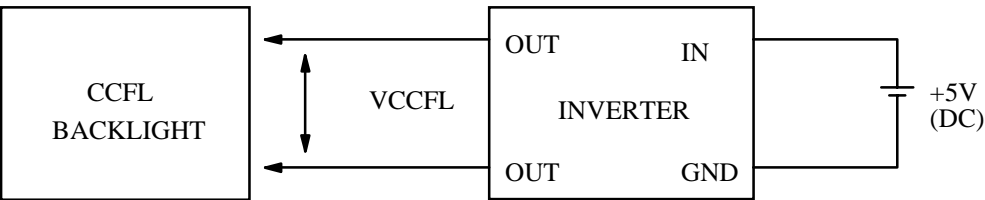
1 1 . POWER SUPPLY

1 1 . 1 POWER SUPPLY FOR LCM



VDD-V0 : LCD DRIVING VOLTAGE
VR : 20K Ω

1 1 . 2 POWER SUPPLY FOR CCFL BACK - LIGHT



RECOMMENDED INVERTER : IA-EM02A

1 1 . 3 TIMING OF POWER SUPPLY AND INTERFACE SIGNAL

